Prevalence of War-Related Mental Health Conditions and Association With Displacement Status in Postwar Jaffna District, Sri Lanka

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Context Nearly 2.7 million individuals worldwide are internally displaced (seeking refuge in secure areas of their own country) annually by armed conflict. Although the psychological impact of war has been well documented, less is known about the mental health symptoms of forced displacement among internally displaced persons.

Objectives To estimate the prevalence of the most common war-related mental health conditions, symptoms of posttraumatic stress disorder (PTSD), anxiety, and depression, and to assess the association between displacement status and these conditions in postwar Jaffna District, Sri Lanka.

Design, Setting, and Participants Between July and September 2009, a cross-sectional multistage cluster sample survey was conducted among 1517 Jaffna District households including 2 internally displaced persons camps. The response rate was 92% (1448 respondents, 1409 eligible respondents). Two percent of participants (n=80) were currently displaced, 29.5% (n=539) were recently resettled, and 68.5% (n=790) were long-term residents. Bivariable analyses followed by multivariable logistic regression models were performed to determine the association between displacement status and mental health.

Main Outcome Measures Symptom criteria of PTSD, anxiety, and depression as measured by the Harvard Trauma Questionnaire and the Hopkins Symptom Checklist–25.

Results The overall prevalences of symptoms of PTSD, anxiety, and depression were 7.0% (95% confidence interval [CI], 5.1%-9.7%), 32.6% (95% CI, 28.5%-36.9%), and 22.2% (95% CI, 18.2%-26.5%), respectively. Currently displaced participants were more likely to report symptoms of PTSD (odds ratio [OR], 2.71; 95% CI, 1.28-5.73), anxiety (OR, 2.91; 95% CI, 1.89-4.48), and depression (OR, 4.55; 95% CI, 2.47-8.39) compared with long-term residents. Recently resettled residents were more likely to report symptoms of PTSD (OR, 1.96; 95% CI, 1.11-3.47) compared with long-term residents. However, displacement was no longer associated with mental health symptoms after controlling for trauma exposure.

Conclusion Among residents of Jaffna District in Sri Lanka, prevalence of symptoms of war-related mental health conditions was substantial and significantly associated with displacement status and underlying trauma exposure.

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Civil conflict in Sri Lanka started in 1983 between government forces and the Liberation Tigers of Tamil Eelam (LTTE), a militant organization fighting to create an independent Tamil state in northern and eastern Sri Lanka.[1] The residents of Jaffna District, a peninsula in the far north of the country, experienced decades of intermittent fighting and population displacement.[2] Road access to Jaffna was blocked in April 2000, severely restricting movement into and out of Jaffna.[3] Following several failed cease-fire attempts, government forces took control of areas previously held by the LTTE and declared victory in May 2009.[4]

Armed conflict can result in profound health consequences including death, injury, infectious disease, and malnutrition. It can result in destruction of social networks, family separation, human rights abuses, and sociopolitical marginalization, which can contribute to long-term physical and psychological sequelae.

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Armed conflicts also result in displacement of persons seeking refuge in neighboring countries or secure areas of their own country. Nearly 2.7 million individuals worldwide are internally displaced annually by armed conflict.[5] The Sri Lankan conflict resulted in approximately 100 000 deaths and displacement of 800 000 people during the 26-year war.[6,7] By July 2009, 2% of Sri Lankans were internally displaced. In Jaffna District, this estimate reached 23%.[8]

Although overall patterns of psychiatric morbidity among conflict-affected populations have been documented, less is known about the psychological effect of forced displacement among individuals who remain within their national borders. Furthermore, limited mental health resources, cultural stigmatization of psychological problems, and poor access to the Jaffna Peninsula have resulted in few studies of mental health conditions in this area.[9-11] To understand the relationship between mental health and displacement, investigators with the US Centers for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF), and the Sri Lanka Ministry of Healthcare and Nutrition conducted a multicomponent health survey among residents of Jaffna District between July and September 2009.

METHODS

Survey Design

The mental health survey was based on a 40 × 40 multistage cluster sample design (FIGURE). The study population comprised all Jaffna District residents aged 15 years or older. The sampling frame was determined by the Sri Lanka 2007 Special Census,[12] and internally displaced persons (IDP) camp data were provided by the United Nations High Commissioner for Refugees, Jaffna suboffice (D.A., written communication, May 28, 2009).

Sample size was based on an estimated prevalence of mental health symptoms of 50% because prevalence data on these symptoms in Jaffna were unavailable. Assuming a design effect of 2 and an 80% response rate, a sample size of 1280 people (1 person per household) was calculated to achieve a ±4.4% precision around the estimated prevalence with a 95% confidence interval (CI).

Jaffna District consists of 435 enumeration areas. To obtain adequate health data on displaced individuals, enumeration areas with larger IDP populations were divided into 4 strata based on the percentage of IDPs and were oversampled. Forty clusters (enumeration areas) were selected with the probability of selection proportional to population size (eTable; available at http://www.jama.com). Each selected cluster was further divided into segments of 200 to 250 households using maps and population data obtained from local officials. One segment per cluster was then chosen by probability of selection proportional to size. Following enumeration of all households in each segment, a systematic random sample of 40 households was generated and 1 individual (aged ≥15 years) was randomly selected per household (Figure).

Interviews were conducted in private. Oral informed consent for adult participants or parental permission and oral assent for minor participants was obtained prior to each interview. Adulthood was defined according to the legal definition in Sri Lanka (≥18 years or ≥16 years if married). If privacy could not be ensured or the interview could not be rescheduled, the interview was considered incomplete. This mental health survey was part of a multicomponent survey. Substitutes were found for individuals only if they had previously participated in another section of the larger survey. Households were not substituted. Participants requesting assistance were referred for follow-up and monitored by UNICEF protection staff. No identifying information was recorded on the survey tools. The study was reviewed and approved by the CDC Institutional Review Board.

Ethnicity was self-reported using categories provided by the investigators and assessed because of its underlying premise for civil conflict. Individuals who did not consent, could not speak Tamil or English, did not reside in the house during the scheduled days of the survey, or were physically or mentally unable to complete the survey were excluded.

Survey Tools

Two standardized questionnaires were adapted from mental health surveys conducted in conflict-affected settings: the Hopkins Symptoms Checklist–25 (HSCL-25)[13,14] and the Harvard Trauma Questionnaire (HTQ).[15] The HSCL-25 consists of 10 questions about symptoms of anxiety and 15 questions about symptoms of depression. A standardized scoring algorithm is used to determine symptoms of anxiety and affective disorders. Each answer receives a score between 1 and 4.[13] A mean cumulative score greater than 1.75 for each category is considered valid for predicting clinical diagnosis of anxiety and affective disorders.[14]

Parts I and IV of the HTQ were used to assess symptoms of posttraumatic stress disorder (PTSD). Traumatic events were adapted for Jaffna and PTSD symptoms were described according to the *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition).[16] Cases of PTSD were defined as reporting at least 1 reexperiencing symptom, at least 3 avoidance/numbing symptoms, and at least 2 arousal symptoms.[17] Recall periods were 10 years for questions related to trauma events and 4 weeks for questions related to anxiety, depression, and PTSD. Data on coping mechanisms and basic demographics were also collected.

Questionnaires were translated into Tamil and back-translated into English by different translators to ensure accuracy. Translated questionnaires were reviewed by UNICEF-Jaffna field staff and were pretested.

Interviewers were female recent university graduates or public health midwives who were fluent in Tamil. Forty interviewers were divided into 8 teams

comprising 1 team leader and 2 interviewer pairs.

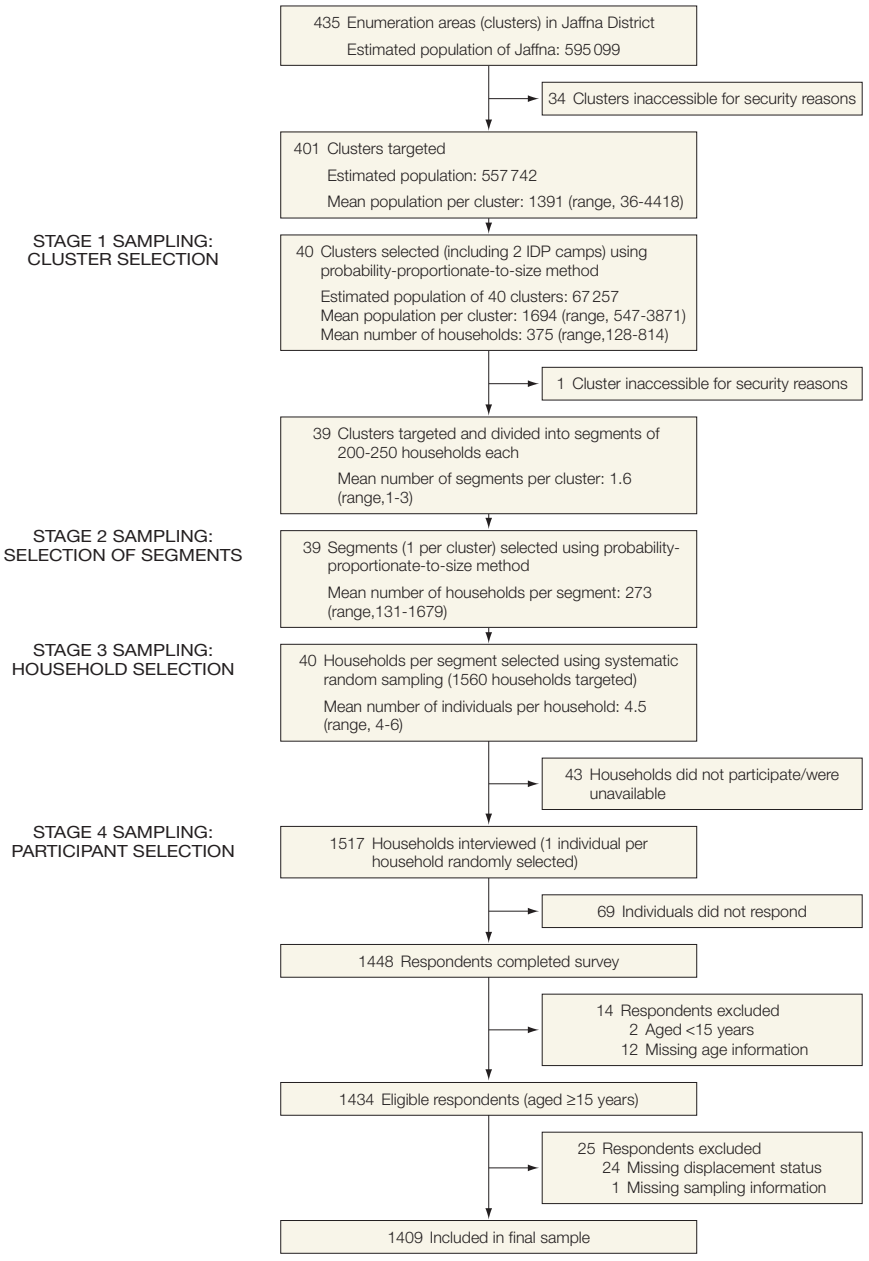
Data Analysis

Data were double-entered into an Epi Info (version 3.5.1)[18] database and comparison reports were generated to resolve discrepancies. The updated master database was maintained and final data cleaning and analysis were conducted by CDC staff. To account for the complex sampling design and differential sampling weights, analyses were conducted using the complex sampling procedures in SPSS (version 17).[19]

To examine the relationship between mental health symptoms and displacement, survey participants were divided into 3 groups: currently displaced (living in an IDP camp), recently resettled (displaced after April 2000 but currently resettled within the community), and long-term residents (displaced before April 2000 or never displaced).

Weighted percentages were calculated for demographics, exposure variables, and mental health symptoms by displacement group. Bivariable logistic regression analyses were conducted to test for the association between potential explanatory variables and mental health. To measure the association of displacement status and mental health conditions, multivariable logistic regression models were used to adjust for variables that demonstrated a statistically significant bivariable association. Demographic variables used in the analyses are known cofactors for anxiety, depression, and PTSD based on previous studies.[20,21] $P<.05$ was considered statistically significant.

Figure. Sampling Scheme for Mental Health Survey, Jaffna District, Sri Lanka



IDP indicates internally displaced persons.

RESULTS

A total of 1517 households were visited; 1448 persons completed the mental health survey and 1409 met the eligibility criteria and were included in the analyses (Figure). One cluster was omitted because of security concerns. The overall response rate was 92%. Eighty (2%; 95% CI, 1.7%-2.2%) participants were currently displaced, 539 (29.5%; 95% CI, 21.0%-39.8%) were recently resettled, and 790 (68.5%; 95% CI, 58.6%-77.1%) were long-term residents (TABLE 1). The majority of participants were Tamil and female. The mean age was 40 years, but currently displaced participants were significantly younger (mean, 32 years; $P<.001$). More than 94% (95% CI, 92.5%-96.3%) received some grade school education, 64% (95% CI, 60.5%-67.6%) were married, 98% (95% CI, 97.0%-99.3%) reported no drug or alcohol use, and 20% (95% CI, 17.1%-24.4%) reported regular income. Aside from age, no statistically significant differences in demographic and social characteristics were observed among the 3 groups.

Trauma Exposure

A total of 376 (31.8%; 95% CI, 26.0%-38.1%) participants experienced no trauma events; 578 (44.0%; 95% CI, 40.0%-48.1%) reported experiencing 1 to 4 events; 336 (20.2%; 95% CI, 14.7%-27.1%) experienced 5 to 9 events; and 72 (4.0%; 95% CI, 2.6%-6.0%) experienced 10 or more events.

Participants reported experiencing a mean of 2.76 trauma events. Currently displaced participants experienced statistically significantly more trauma than participants outside of camps. More than half (57.9%; 95% CI, 51.4%-64.2%) of displaced participants experienced 10 or more events compared with 4.0% (95% CI, 2.1%-7.6%) of resettled and 2.5% (95% CI, 1.2%-5.4%) of long-term residents, respectively ($P<.001$). There were significant differences by displacement for all individual trauma events except for being beaten by a combatant, being tortured, and being imprisoned.

The most common coping mechanism was talking to family or friends. Participants from all 3 groups reported that more income and employment would help their current state of mind most. No statistically significant differences in coping mechanisms were observed (TABLE 2).

Mental Health Outcomes

Overall, the prevalences of PTSD, anxiety, and depression symptoms were 7.0% (95% CI, 5.1%-9.7%), 32.6% (95% CI, 28.5%-36.9%), and 22.2% (95% CI, 18.2%-26.5%), respectively. The prevalence of symptoms for each of the 3 mental health conditions was highest among currently displaced persons (TABLE 3).

Table 1. Demographic and Social Characteristics, Jaffna District (N = 1409)

Characteristics	No. (%) [95% Confidence Interval][a] Currently Displaced (n = 80)	Resettled Residents (n = 539)	Long-term Residents (n = 790)	Pearson χ^2	*P* Value[b]
Tamil	80 (100)	537 (99.8)	788 (99.8)	0.119	.89
Sex					
Male	40 (52.1) [51.9-52.4]	161 (27.8) [21.0-35.9]	247 (32.5) [28.9-36.2]	8.50	.09
Female	40 (47.9) [47.6-48.1]	378 (72.2) [64.2-79.0]	543 (67.5) [63.8-71.1]		
Age, y					
15-17	3 (4.2) [0.6-24.5]	31 (7.2) [4.2-12.3]	57 (10.7) [8.4-13.6]	6.55[c]	.009
18-34	48 (61.2) [53.5-68.4]	157 (32.4) [26.6-38.7]	238 (32.1) [27.9-36.8]		
35-59	24 (32.4) [32.1-32.7]	243 (45.8) [39.9-51.9]	319 (39.2) [34.5-44.2]		
≥60	5 (2.1) [1.4-3.2]	108 (14.6) [10.5-19.9]	176 (17.9) [14.2-22.4]		
Mean (SD)	32.74 (10.30)	40.13 (16.27)	40.24 (17.82)		
Highest level of education					
None/kindergarten	0	5 (0.9) [0.3-3.1]	10 (1.2) [0.42-3.5]	2.11	.23[d,e]
Grades 1-13	80 (100)	508 (96.1) [93-97.8]	738 (94.0) [91.0-96.1]		
Higher education (certificate/bachelor's/master's/doctorate)	0	26 (3.0) [1.6-5.56]	42 (4.7) [2.8-7.9]		
Marital status (n = 1408)					
Married	62 (80.3) [72.7-86.2]	367 (68.3) [62.4-73.8]	507 (61.8) [57-66.4]	5.34	.09[d,f]
Never married	14 (16.7) (11.2-24)	113 (22.9) (18.2-28.4)	197 (29.3) (25.5-33.4)		
Widowed	4 (3.0) [2.7-3.4]	49 (7.6) [4.8-11.8]	70 (7.2) [5.2-1.1]		
Separated	0	8 (1.0) [0.4-2.6]	13 (1.5) [0.8-2.8]		
Divorced	0	2 (0.1) [0-0.6]	2 (0.1) [0-0.6]		
Regular income (n = 1396)					
No	78 (97.6) [85.1-99.7]	432 (83.5) [77.5-88.2]	596 (77.2) [72.4-81.4]	6.76	.01[d]
Yes	2 (2.4) [0.4-14.9]	104 (16.5) [11.8-22.5]	184 (22.8) [18.6-27.6]		
Drug use (n = 1408)					
No	79 (100)	527 (97.0) [94.7-98.3]	785 (99.2) [96.0-99.9]	9.81	.10[d]
Yes	0	12 (3.0) [1.7-5.3]	5 (0.8) [0.1-4.0]		
Alcohol use (n = 1407)					
Never	73 (90.9) [89.1-95.8]	509 (95.0) [92-96.9]	755 (95.1) [92.9-96.8]	0.381	.84[d,g]
≤1 drink/d	1 (0.3) [0-2.5]	16 (2.3) [1.3-4.2]	16 (2.0) [1.0-4.0]		
>1 drink/d	1 (2.1) [0.3-16.1]	13 (2.3) [1.2-4.6]	18 (2.8) [1.7-4.6]		
No response	4 (4.2) [0.6-26]	1 (0.4) [0.1-2.6]	0		

[a] Data are expressed as number (weighted percentage [adjusted for sampling]) [95% confidence interval] unless otherwise noted. Data may be missing for some participants.
[b] Test of significance was conducted for cells ≥5. Categories were collapsed or excluded where indicated.
[c] Adjusted *F* score.
[d] Test of significance was performed for resettled vs long-term residents only.
[e] Test of significance was performed for the collapsed group of none/kindergarten/grades 1 through 13 vs higher education.
[f] Test of significance was performed for the collapsed group of not married (never married, widowed, separated, or divorced) vs married.
[g] No response was excluded from test of significance.

Bivariable Analysis

The relationship between explanatory variables and mental health symptoms was examined. Sex, age, regular income, marital status, talking to family or friends (the primary coping mechanism), number of trauma events, and displacement status are presented as independent variables. Symptoms of PTSD, anxiety, and depression are presented as dependent variables.

Being female and not having regular income were associated with anxiety and depression symptoms (TABLE 4). Being married, older age, and having greater trauma exposure were associated with PTSD, anxiety, and de-

Table 2. Trauma Exposure and Coping Mechanisms by Displacement Status, Jaffna District (N = 1409)

	No. (%) [95% Confidence Interval][a]				
	Currently Displaced (n = 80)	Resettled Residents (n = 539)	Long-term Residents (n = 790)	Pearson χ^2	*P* Value[b]
Trauma events					
Lack of shelter (n = 1396)	69 (86.4) [68.7-94.8]	319 (64.3) [57.3-70.8]	200 (25.9) [20.7-31.8]	207.79	<.001
Loss or destruction of property or belongings (n = 1395)	78 (97.6) [81.6-99.7]	348 (65.2) [58.1-71.7]	187 (24.6) [20.7-29]	143.19	<.001
Lack of food or water (n = 1396)	63 (77.6) [76.6-78.5]	271 (57.3) [48-66.2]	177 (24.6) [19.5-30.6]	156.93	<.001
Forced displacement (n = 1392)	78 (99.1) [94.2-99.9]	402 (71.5) [62.6-79]	95 (12.1) [8.9-16.4]	302.75	<.001
Ill health without access to medical care (n = 1393)	65 (85.8) [79.8-90.3)	206 (40.9) [33.6-48.6)	129 (17.2) [12.9-22.6)	137.70	<.001
Attacks/bombardment with shells/rockets (n = 1394)	66 (80.0) [59.6-91.6)	133 (22.8) [18-28.5]	74 (9.2) [6.2-13.3]	43.58	<.001
Living in an internally displaced persons camp (n = 1396)	79 (100)	99 (20.1) [14.2-27.8]	35 (5.8) [3.6-9.1]	131.15	<.001
Caught in the crossfire of an attack or battle (n = 1393)	63 (76.9) [68-83.9]	114 (19.3) [13.3-27.2]	30 (4.7) [2.9-7.4]	76.30	<.001
Shot at with a gun (n = 1395)	48 (60.9) [43.8-75.7]	40 (8.5) [5.2-13.5]	56 (7.0) [4.1-11.6]	39.42	<.001
Death of family member/friend due to illness or lack of food (n = 1395)	26 (31.7) [19.5-47]	66 (11.3) [7.5-16.8]	94 (12.2) [9-16.4]	3.47	.049
Death of family member/friend due to fighting, murder, or suicide (n = 1395)	24 (28.8) [18.3-42.2]	53 (8.2) [5.2-12.7]	65 (8.3) [5.4-12.7]	6.72	.003
Death of acquaintance due to fighting, murder, or suicide (n = 1395)	24 (29.1) [21.2-38.5]	50 (6.9) [4.3-10.8]	62 (8.1) [5.3-12.2]	6.91	.006
Missing or lost family members (n = 1395)	24 (31.2) [23.9-39.5]	45 (7.8) [5.3-11.5]	42 (5.6) [3.1-9.8]	10.05	.001
Interrogation/harassment by combatants and/or others with threats to life (n = 1396)	30 (37.3) [18.9-60.2]	43 (8.1) [5.8-11.2]	18 (2.9) [1.5-5.8]	19.95	<.001
Forced separation from family (n = 1394)	39 (50.3) [30.5-70]	40 (7.3) [4.9-10.7]	21 (2.7) [1.2-5.8]	30.06	<.001
Beatings by combatants or others (n = 1394)	10 (11.2) [10.8-11.7]	25 (5.1) [2.7-9.3]	14 (2.4) [1.0-5.7]	3.67	.06
Torture (systematic infliction of intense pain used to punish or coerce) (n = 1394)	7 (6.7) [6.3-7.1]	17 (3.4) [1.5-7.8]	14 (2.7) [1.1-6.1]	0.49	.50
Injury from a knife, gun, or other weapon (n = 1395)	28 (32.7) [20.2-48.4]	15 (2.0) [0.8-5.1]	22 (2.1) [1.1-3.9]	41.57	<.001
Kidnapping or abduction (n = 1394)	8 (9.8) [6.9-13.9]	12 (2.8) [1.4-5.6]	7 (1.3) [0.5-3.5]	4.60	.03
Imprisonment (n = 1392)	5 (5.2) [1.2-19.8]	18 (3.4) [1.7-6.9]	9 (1.1) [0.4-3.4]	2.72	.09
Disability from an injury received during a battle or attack (n = 1394)	10 (13.3) [2.6-46.7]	4 (0.5) [0.2-1.4]	2 (0.5) [0.1-3.0]	NA[c]	NA[c]
Injury from a land mine or unexploded ordnance (n = 1394)	13 (15.8) [10-23.9]	8 (0.9) [0.4-2]	0	145.40	<.001
Rape or sexual abuse (n = 1391)	0	4 (0.4) [0.1-1.2]	1 (0.1) [0-0.8]	NA[c]	NA[c]
Total No. of trauma events (n = 1362)					
0	0	51 (9.5) [6.1-14.5]	325 (42.5) [37.2-48.0]	177.40[d]	<.001
1-4	1 (1.0) [0.1-8.7]	225 (40.4) [35.2-45.9]	352 (46.8) [42.7-50.9]		
5-9	29 (41.0) [36.9-45.3]	234 (46.0) [39.9-52.3]	73 (8.2) [5.5-12.0]		
≥10	42 (57.9) [51.4-64.2]	20 (4.0) [2.1-7.6]	10 (2.5) [1.2-5.4]		
Mean (SD)	10.64 (3.17)	4.39 (2.89)	1.84 (2.65)		

(continued)

Table 2. Trauma Exposure and Coping Mechanisms by Displacement Status, Jaffna District (N = 1409) (continued)

	No. (%) [95% Confidence Interval][a]				
	Currently Displaced (n = 80)	Resettled Residents (n = 539)	Long-term Residents (n = 790)	Pearson χ^2	*P* Value[b]
Coping mechanisms (n = 1407)					
Talking to family/friends	53 (68.2) [41.2-86.7]	369 (67.5) [60.9-73.4]	583 (75.4) [71.1-79.3]		.
Prayer/religion	7 (7.9) [0.8-47.0]	78 (14.5) [10.0-20.4]	85 (8.7) [6.3-12.0]		
Being alone/crying	8 (9.4) [3.0-26.0]	32 (6.6) [4.3-10.0]	30 (4.6) [3.6-5.9]		
Other counseling (religious leader, traditional healer)	4 (4.5) [2.7-7.7]	31 (5.4) [3.0-9.5]	34 (3.9) [2.2-6.8]		
Medical assistance	1 (2.1) [0.3-13.2]	3 (0.6) [0.2-2.1]	1 (0.1) [0-0.7]	9.44	.08[e]
Counseling from mental health care professional	2 (3.0) [1.0-8.8]	0	0		
Music/television/films	0	5 (1.0) [0.2-3.8]	16 (1.9) [1.1-3.4]		
Nothing/does not worry	3 (3.6) [2.9-4.5]	15 (3.6) [2.1-6.2]	29 (3.5) [2.3-5.2]		
Other	2 (1.2) [0.1-9.8]	5 (1.0) [0.3-3.0]	11 (1.7) [1.0-3.1]		
What would help current state of mind the most? (n = 1406)					
More income	17 (25.5) [18.3-34.3]	198 (37.8) [32.5-43.7]	270 (33.6) [29.8-37.9]		
Employment	25 (30.9) [21.1-42.8]	111 (23.2) [18.4-28.9]	156 (21.0) [18.4-24.1]		
Education/skills training	2 (2.1) [0.3-13.2]	52 (9.4) [6.7-13.2]	70 (12.0) [9.8-14.8]		
Better housing	12 (14.8) [10.6-20.5]	53 (10.4) [7.7-13.9]	83 (9.8) [7.2-13.2]		
Humanitarian assistance	14 (16.4) [14.5-18.5]	17 (2.7) [1.4-5.2]	34 (5.0) [3.3-7.6]		
Better general health care	1 (0.9) [0.1-7.5]	24 (4.0) [2.1-7.4]	43 (4.5) [3.1-6.5]		
Security	1 (1.2) [0.1-9.8]	17 (2.3) [0.9-5.6]	21 (1.9) [1-3.5]	3.36	.19[f]
Better mental health care	0	7 (1.4) [0.5-4.1]	12 (1.4) [0.6-3.3]		
Access to food	1 (0.9) [0.1-5.9]	6 (1.4) [0.4-5.1]	16 (1.4) [0.7-2.6]		
Infrastructure	0	8 (1.0) [0.4-2.5]	7 (0.7) [0.3-1.7]		
Clean water	0	6 (0.6) [0.3-1.3]	5 (0.5) [0.1-1.7]		
Other (children's education/future, freedom)	7 (7.3) [2.7-18.2]	39 (5.8) [3.3-10.1]	71 (8.1) [5.1-12.7]		

[a] Data are expressed as number (weighted percentage [adjusted for sampling]) [95% confidence interval] unless otherwise noted. Data may be missing for some participants.
[b] Test of significance was conducted for cells ≥5. Categories were collapsed or excluded where indicated.
[c] NA indicates not applicable; no test of significance was conducted.
[d] Adjusted *F* score.
[e] Test of significance was performed for talking to family/friends vs the collapsed group of all other responses.
[f] Test of significance was performed for more income vs the collapsed group of all other responses.

pression symptoms. The association between number of trauma events and mental health symptoms also showed a dose-response relationship. Talking to family and friends was not significantly associated with any of the 3 mental health symptoms and was excluded from further analysis.

Currently displaced participants were more likely to report PTSD (odds ratio [OR], 2.63; 95% CI, 1.63-4.23), anxiety (OR, 2.18; 95% CI, 1.72-2.77), and depression (OR, 2.87; 95% CI, 1.98-4.15) symptoms while resettled residents were more likely to report symptoms of PTSD (OR, 2.08; 95% CI, 1.19-3.63) and anxiety (OR, 1.37; 95% CI, 1.02-1.84) compared with long-term residents (Table 4).

Multivariable Analysis

Logistic regression analysis was used to assess the association between each mental health symptom and displacement status. Covariates were age, sex, regular income, marital status, and trauma exposure.

As shown in TABLE 5, female respondents remained more likely to report symptoms of anxiety (OR, 2.43; 95% CI, 1.79-3.30) and depression (OR, 1.75; 95% CI, 1.25-2.43); having no regular income was associated only with depression (OR, 1.77; 95% CI, 1.17-2.68). Older age was associated with PTSD, anxiety, and depression symptoms. Marital status was no longer a significant risk factor.

After adjusting for these covariates, the prevalences of symptoms of depression (OR, 4.55; 95% CI, 2.47-8.39), anxiety (OR, 2.91; 95% CI, 1.89-4.48), and PTSD (OR, 2.71; 95% CI, 1.28-5.73) were significantly higher among displaced camp-based individuals compared with long-term residents. The prevalence of PTSD symptoms among recently resettled participants was almost twice (OR, 1.96; 95% CI, 1.11-3.47) that of long-term residents. However, when trauma exposure was added to the model, the association between displacement status and mental health symptoms was no longer significant (Table 5).

COMMENT

This study found the overall prevalences of PTSD, anxiety, and depression symptoms among Jaffna resi-

dents to be 7.0%, 32.6%, and 22.2%, respectively. Prevalences of symptoms of all 3 mental health conditions were highest among currently displaced persons.

Similar studies conducted in postwar settings found higher prevalences of symptoms of PTSD, anxiety, and depression than found in our study. Symptoms of PTSD and anxiety were reported in 17% and 72% of Kosovars in 1998, respectively; while 42% and 68% of Afghans reported PTSD and depression symptoms, respectively, in 2001.[20,21]

The lower prevalence of mental health conditions found in Jaffna may be a reflection of the prolonged nature of the conflict. Studies have suggested that the severity of mental health conditions is reduced during protracted war situations as communities learn to develop "survival skills."[10] The Sri Lankan conflict lasted 26 years; thus, high-risk situations may have been normalized and residents may have learned to cope with continuous exposure to conflict-related events. A more appropriate measure of the effect of the conflict might be the mental health status of those living in IDP camps because of their recent experience with active armed conflict.

Table 3. Prevalence of PTSD, Anxiety, and Depression by Displacement Status, Jaffna District (N = 1409)

Mental Health Symptoms	Prevalence, No. (%) [95% Confidence Interval][a]				Pearson χ^2	*P* Value
	Overall (n = 1409)	Currently Displaced (n = 80)	Resettled Residents (n = 539)	Long-term Residents (n = 790)		
PTSD	125 (7.0) [5.1-9.7]	13 (13.0) [10.6-16]	61 (10.6) [7.1-15.6]	50 (5.4) [3.6-8]	13.45	.007
Anxiety	497 (32.6) [28.5-36.9]	38 (48.5) [45.8-51.1]	205 (37.1) [30.8-43.9]	250 (30.1) [25.9-34.8]	9.71	.01
Depression	365 (22.2) [18.2-26.5]	34 (41.8) [36.0-47.8]	155 (25.4) [17.7-35.1]	172 (20.0) [16.0-24.9]	11.28	.09

Abbreviation: PTSD, posttraumatic stress disorder.
[a]Percentages are weighted (adjusted for sampling). Data may be missing for some participants.

Table 4. Bivariate Analysis: Association Between Demographic Variables, Coping Mechanisms, and Trauma Exposure and PTSD, Anxiety, and Depression, Jaffna District (N = 1409)

Characteristics	PTSD		Anxiety		Depression	
	No. (%) [95% CI][a]	Crude OR (95% CI)	No. (%) [95% CI][a]	Crude OR (95% CI)	No. (%) [95% CI][a]	Crude OR (95% CI)
Sex						
Male	32 (5.1) [2.9-9.0]	1 [Reference]	106 (19.9) [15.0-25.8]	1 [Reference]	89 (15.5) [11.1-21.1]	1 [Reference]
Female	93 (7.9) [5.6-11.2]	1.6 (0.8-3.0)	391 (38.4) [34.5-42.5]	2.5 (1.9-3.3)[b]	276 (25.2) [21.1-29.9]	1.8 (1.4-2.5)[b]
Marital status						
Married	92 (8.8) [5.9-13.0]	2.4 (1.3-4.5)[b]	355 (37.7) [32.6-43.0]	2.0 (1.4-2.8)[b]	254 (24.1) [19.6-29.4]	1.4 (1.1-1.8)[b]
Not married	33 (3.9) [2.6-5.9]	1 [Reference]	142 (23.6) [18.8-29.3]	1 [Reference]	111 (18.8) [14.6-23.7]	1 [Reference]
Regular income						
Yes	21 (5.5) [3.2-9.3]	1 [Reference]	72 (26.0) [19.5-34.4]	1 [Reference]	52 (15.5) [10.8-21.6]	1 [Reference]
No	104 (7.6) [5.3-10.7]	1.4 (0.7-2.7)	423 (34.4) [29.9-39.1]	1.5 (1.0-2.2)[b]	311 (23.8) [19.4-28.8]	1.7 (1.2-2.5)[b]
Age, y						
15-17	4 (1.9) [0.6-5.3]	0.2 (0.1-0.5)[b]	10 (10.1) [5.0-19.4]	0.1 (0.1-0.3)[b]	3 (2.0) [0.4-8.8]	0.0 (0.0-0.2)[b]
18-34	29 (5.9) [3.1-10.7]	0.5 (0.3-0.9)[b]	114 (24.9) [18.4-32.9]	0.4 (0.2-0.6)[b]	75 (14.8) [10.5-20.5]	0.3 (0.2-0.4)[b]
35-59	52 (7.4) [5.2-10.5]	0.6 (0.4-1.1)	239 (38.1) [32.9-43.5]	0.7 (0.5-1.1)	171 (25.4) [19.4-32.5]	0.5 (0.3-0.7)[b]
≥60	40 (11.4) [7.4-17.2]	1 [Reference]	134 (47.0) [37.5-56.7]	1 [Reference]	116 (40.5) [32.8-48.6]	1 [Reference]
Trauma events						
0	14 (2.0) [1.0-4.0]	1 [Reference]	92 (21.2) [16.9-26.2]	1 [Reference]	55 (12.4) [8.9-17.0]	1 [Reference]
1-4	46 (7.1) [4.8-10.4]	3.7 (1.7-8.3)[b]	197 (35.5) [30.1-41.4]	2.1 (1.4-2.9)[b]	131 (22.6) [17.6-28.5]	2.1 (1.4-3.1)[b]
5-9	44 (11.2) [6.9-17.7]	6.1 (3.1-12.1)[b]	155 (41.6) [33.0-50.7]	2.7 (1.7-4.1)[b]	135 (33.4) [24.6-43.6]	3.6 (2.2-5.8)[b]
≥10	15 (20.8) [9.2-40.6]	12.7 (4.2-38.7)[b]	35 (50.7) [25.9-75.1]	3.8 (1.2-12.4)[b]	30 (39.0) [18.2-64.7]	4.5 (1.5-13.8)[b]
Talking to family/friends as coping mechanism						
Yes	87 (6.5) [4.5-9.2]	1 [Reference]	338 (30.7) [26.6-35.2]	1 [Reference]	239 (20.7) [16.2-26.1]	1 [Reference]
No	38 (8.6) [5.4-13.5]	0.7 (0.4-1.2)	159 (37.6) [30.3-45.4]	0.7 (0.5-1.0)	126 (26.1) [19.9-33.3]	0.7 (0.5-1.1)
Displacement status						
Currently displaced	13 (13.0) [10.6-16.0]	2.6 (1.6-4.2)[b]	38 (48.5) [45.8-51.1]	2.2 (1.7-2.8)[b]	34 (41.8) [36.0-47.8]	2.9 (2.0-4.2)[b]
Resettled resident	61 (10.6) [7.0-15.6]	2.1 (1.2-3.6)[b]	205 (37.1) [30.8-43.9]	1.4 (1.0-1.8)[b]	155 (25.4) [17.7-35.1]	1.4 (0.8-2.3)
Long-term resident	50 (5.4) [3.6-7.9]	1 [Reference]	250 (30.1) [25.9-34.8]	1 [Reference]	172 (20.0) [15.9-24.9]	1 [Reference]

Abbreviations: CI, confidence interval; OR, odds ratio; PTSD, posttraumatic stress disorder.
[a]Percentages are weighted (adjusted for sampling). Data may be missing for some participants.
[b]Statistically significant difference ($P<.05$) vs reference.

The prevalence of PTSD (13%), anxiety (48.5%), and depression (41.8%) symptoms among currently displaced Jaffna residents is more comparable with postwar Kosovars and Afghans.[20,21]

Approximately 68% of Jaffna residents experienced at least 1 trauma event and most individuals experienced multiple traumas (mean, 2.76 trauma events). A dose-response relationship between the number of trauma events and psychiatric morbidity was evident. Chronic exposures to trauma events corresponded with higher levels of PTSD, anxiety, and depression symptoms and were significantly associated with displacement status.

We identified subpopulations at higher risk of poor mental health. Higher prevalence of anxiety and depression symptoms in women is not surprising considering that women are at higher risk of negative health consequences in these settings.[20-22] Displacement affects women and men differently, altering family structures and gender roles. In Jaffna, men often left their homes to seek employment or to join the conflict, either voluntarily or by force. Abduction and recruitment of men was widespread, leaving women to care for families and take on traditional male responsibilities. These stressors, in addition to the gender-based violence often faced by women during wartime, make women more vulnerable to mental health problems.[22]

Protracted conflict also affects economic development. Decades of instability and isolation have left Jaffna with high unemployment and a lack of infrastructure, technology, and business development opportunities.[23] Financial difficulties were an underlying problem facing most residents; only 20% of participants reported regular income. Jaffna is primarily an agricultural community where farming, fishing, and herding are the most common occupations. Displacement, land mines, and restricted access to "high-security zones" left many without jobs. This is more pronounced among IDPs, who often lack proper documentation and resort to the informal job sector.

The association between age and mental health may be a reflection of the length of exposure to war trauma among various age groups, whereby older participants experienced longer exposure periods. Older individuals may also be less resilient to negative mental health consequences of violent conflict.

There were several limitations to this study. The study was cross-sectional, making it impossible to establish temporal or causal relationships. It is uncertain whether the mental health symptoms were associated with being in camps or with events prior to arrival in camps, including exposure to trauma. No national baseline data on

Table 5. Multivariable Analysis: Association Between Demographic Variables and Displacement Status and PTSD, Anxiety, and Depression, Jaffna District (N = 1409)

Characteristics	PTSD		Anxiety		Depression	
	No.	Adjusted OR (95% CI)[a]	No.	Adjusted OR (95% CI)[a]	No.	Adjusted OR (95% CI)[a]
Sex						
Male	32	1 [Reference]	106	1 [Reference]	89	1 [Reference]
Female	93	1.56 (0.8-3.2)	391	2.43 (1.8-3.3)[c]	276	1.75 (1.3-2.4)[c]
Marital status						
Married	92	2.07 (0.9-5.0)[b]	355	1.37 (0.9-2.1)[b]	254	0.72 (0.5-1.1)[b]
Not married	33	1 [Reference]	142	1 [Reference]	111	1 [Reference]
Regular income						
No	104	1.37 (0.7-2.6)	423	1.49 (0.9-2.4)[b]	311	1.77 (1.2-2.7)[c]
Yes	21	1 [Reference]	72	1 [Reference]	52	1 [Reference]
Age, y						
15-17	4	0.24 (0.1-0.9)[c]	10	0.14 (0.1-0.4)[c]	3	0.02 (0-0.1)[c]
18-34	29	0.46 (0.2-0.9)[c]	114	0.33 (0.2-0.6)[c]	75	0.20 (0.1-0.3)[c]
35-59	52	0.48 (0.3-0.9)[c,d]	239	0.55 (0.4-0.8)[c,d]	171	0.47 (0.3-0.7)[c]
≥60	40	1 [Reference]	134	1 [Reference]	116	1 [Reference]
Displacement status						
Currently displaced	13	2.71 (1.3-5.7)[c]	38	2.91 (1.9-4.5)[c]	34	4.55 (2.5-8.4)[c]
Resettled resident	61	1.96 (1.1-3.5)[c]	205	1.26 (1.0-1.7)	155	1.34 (0.8-2.4)
Long-term resident	50	1 [Reference]	250	1 [Reference]	172	1 [Reference]
Displacement status (including trauma events)						
Currently displaced	13	0.59 (0.19-1.78)	38	1.01 (0.4-2.4)	34	1.07 (0.5-2.5)
Resettled resident	61	1.41 0.77-2.58)	205	0.95 (0.7-1.3)	155	0.95 (0.5-1.8)
Long-term resident	50	1 [Reference]	250	1 [Reference]	172	1 [Reference]

Abbreviations: CI, confidence interval; OR, odds ratio; PTSD, posttraumatic stress disorder.
[a] Adjusted for sex, marital status, regular income, and age.
[b] Change to not statistically significant vs in bivariable analysis.
[c] Statistically significant difference ($P<.05$) vs reference.
[d] Change to significant vs in bivariable analysis.

these mental health symptoms were available to compare findings. Although the survey tools were not validated in Jaffna, they have shown internal consistency among other postwar populations. Without clinical interviews and a measure of psychosocial dysfunction, prevalence estimates from these survey instruments cannot represent a clinical diagnosis. Additionally, self-reported data are subject to recall bias, especially given the 10-year recall for trauma events. Lastly, women were overrepresented in our sample, suggesting possible selection bias. Because of curfew enforcement, surveys were conducted during the day, when women were more likely to be home.

CONCLUSION

Several studies have examined the mental health of Sri Lankan Tamils both within and outside of Sri Lanka.[10,24-26] To the best of our knowledge, this is the first district-wide population-based study to assess the mental health status of Jaffna residents and of internally displaced residents in particular. Mental health symptoms affected up to one-third of participants and almost half of those living in IDP camps. Rather than distinct or isolated traumatic events, IDPs experience multiple stressors that accumulate long after conflicts have ended. Insecurity, deteriorating living conditions, loss of livelihood, and lack of services can exacerbate already fragile psyches and result in immediate and long-term psychiatric morbidity.[27]

Meta-analyses of displacement factors and mental health status of conflict-affected populations found that IDPs scored lower on mental health indexes than displaced and resettled refugees, supporting our findings that internal displacement may have greater negative effects on mental health.[28,29] This may be due to the recency of the trauma IDPs have experienced, as indicated by the association between trauma exposure and symptoms of all 3 mental health conditions. Although the association between displacement status and symptoms of PTSD, depression, and anxiety was no longer significant after adjusting for trauma exposure in this study, the act of being displaced and the daily stressors associated with it may be considered traumatic in themselves and may be an indicator or proxy for recent trauma as well. Therefore, the relationship between displacement status and mental health symptoms may be driven by the underlying trauma events displaced persons have experienced, events that likely caused them to leave their homes.

The Sri Lankan Ministry of Healthcare and Nutrition has recently formed the first national mental health policy.[30] Our data suggest that interventions should target the most vulnerable populations, especially those living in displacement camps. Internally displaced persons outnumber refugees globally and initiatives addressing mental health needs, such as those developed by the Inter-Agency Standing Committee, should be considered.[31] In Jaffna District, interventions should include support from family, friends, religious leaders, and traditional counselors.[10] Finally, a longitudinal study of displaced populations would help determine how the intensity of events, the time since events, and other factors, such as coping skills, affect mental health symptoms. In this way, stakeholders could begin to understand the short- and long-term mental health implications of armed conflict and traumatic events associated with displacement.

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Study concept and design: Husain, Anderson, Lopes Cardozo, Becknell, Blanton, Araki, Vithana.
Acquisition of data: Husain, Anderson, Becknell, Araki.
Analysis and interpretation of data: Husain, Anderson, Lopes Cardozo, Blanton, Vithana.
Drafting of the manuscript: Husain, Anderson, Becknell.
Critical revision of the manuscript for important intellectual content: Husain, Anderson, Lopes Cardozo, Becknell, Blanton, Araki, Vithana.
Statistical analysis: Husain, Anderson, Blanton.
Obtained funding: Anderson, Araki.
Administrative, technical, or material support: Anderson, Becknell, Araki, Vithana.
Study supervision: Anderson, Araki, Vithana.

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The heart and soul of all men being one, this bitterness of *His* and *Mine* ceases. His is mine. I am my brother, and my brother is me.

—Ralph Waldo Emerson (1803-1882)